

Method and arrangement providing a virtual continuous connection

Field of the invention

The present invention is related to data communication
5 networks, and in particular a dial up solution in data
communication networks using a protocol stack like TCP/IP.

Background of the invention

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The ability for a data communication network to communicate
with other networks are almost always required. The chosen
10 connection utilized in this communication is a balance
between cost and need. For example, for some applications,
a continuous, fixed connection, e.g. a cable exclusive for
that purpose may be provided. Fig. 1 shows an example of
such a connection between system A and system B, both using
15 TCP/IP and PPP(Point to Point Protocol) divided into the
four lowest layers of the OSI model. However, this is a
quite expensive solution for long distances, and it is only
defensible if the connection is in operation at nearly all
times.

20 Thus, a circuit switched network, e.g. PSTN (Public
Switched Telecommunication Network), or ISDN (Integrated
Services Digital Network) used as interconnection medium
may be more convenient. Virtual continuous connection is
made by using dial up modems connected to and compatible
25 for the actual telephone network. Fig. 2 shows the system
of Fig. 1 wherein the fixed cable is replaced with a
telephone network and a compatible modem.

This is an inefficient way of utilizing a telephone network
which may result in unnecessary costs. There must be a dial

up support in addition to a protocol stack (e.g. TCP/IP) and a layer 2 protocol (e.g. PPP).

In prior art, this dial up support is integrated in layer 3, e.g. the IP -layer (Fig. 3). Normally, the IP layer includes a forwarding table which has a logical connection between a destination address and the interface to which IP packets are sent. An example of such a table is shown in table 1.

Network address	Network mask	Use interface
10.10.10.0	255.255.255.0	PPP
10.10.30.0	255.255.255.0	ETH
10.10.40.0	255.255.255.0	PPP

Table 1: A forwarding table in an IP layer

To extend this for dial out, the table also has a logical connection between a destination address and a telephone number. The telephone number is dialed when an IP-packet is forwarded. There may be more telephone numbers than modems, if not all connections need to be active at the same time.

Network address	Network mask	Use number
10.10.10.0	255.255.255.0	12345678
10.10.40.0	255.255.255.0	004612345678

Table 2: A forwarding table in an IP layer including telephone numbers

The extended functionality is implemented as part of the IP layer (L3) (Fig. 3).

The problem with the above mentioned solution is that third party router stack implementations, e.g. TCP/IP, generally do not provide dial up support as an integrated part of the

layer 3 implementation, e.g. IP layer implementation, and for an integration, a major redesign is necessary.

Summary of the invention

It is an object of the present invention to provide an
5 arrangement that eliminates the drawbacks described above. The features defined in the claims enclosed characterize this method.

More specifically, the present invention provides a method and an arrangement for connection between different
10 communication systems through a telephone network. In an OSI layered system, the connection is established using a dial up modem compatible with the actual telephone system. A modem control logic is integrated in layer 2, and simulates a continuous connection towards layer 3.

15 Brief description of the drawings

In order to make the invention more understandable, the discussion that follows will refer to the accompanying drawings.

Fig. 1 shows a fixed cable connection between two systems
20 using TCP/IP protocol stack and PPP layer 2 protocol.

Fig. 2 shows the two systems of Fig.1 connected through a telephone network by using a modem compatible with the telephone network.

Fig. 3 shows system A of Fig. 1 connected to other systems
25 by using a modem compatible with the telephone network including an extended dial up function integrated in the IP layer.

Fig. 4 is a closer view of system A according to the present invention with a modem control logic integrated in the PPP layer.

Fig. 5 shows system A according to the present invention; a modem control logic in the PPP layer, connected to system B through a telephone network.

An example embodiment of the present invention

The present invention will now be described in conjunction with an example embodiment. However, the present invention is not limited to this particular embodiment, but may be used in other applications with various substitutions without departing from the scope of the invention as defined in the enclosed claims.

In the example discussed, the system is divided into layers according to the OSI model wherein the protocols TCP, IP and PPP are used in layer 4 (L4) layer 3 (L3) and layer 2 (L2), respectively.

According to the present invention, all the dial up functionality is isolated in PPP (L2), and the IP (L3) may be left unchanged.

The original PPP (L2) function is extended with a modem control logic that hides the dial up functionality for IP (L3). This new extended PPP module is called "DIAL-UP PPP", and simulate a continuous connection seen from the IP (L3).

"DIAL-UP PPP" (L2) provides a virtually continuous connection, because the dial-up functionality is not seen by IP (L3).

All messages to "DIAL-UP PPP" from IP are sensed by the modem control logic which initiates a dial out.

The modem control logic will have timers for closing the dial out connection if there are no more messages. The IP
5 (L3) will still believe that there is an open connection to the destination of the last transmitted message. When a subsequent message belonging to the same virtual connection is transmitted from the IP layer, a new dial out will be required, but this will automatically be initiated by the
10 modem control logic, and will not affect the IP (L3) or any of the upper layers.

For dial in, the call will be answered by the control logic, and the message is sent to IP by "DIAL-UP PPP".

Since the upper layers is intended to experience this as a
15 continuous connection, the same number has to be dialled every time within the same virtual connection.

Synchronisation with the remote PPP driver has to be done in a way that do not disturb the upper layers, so that the upper layer at any time will experience a continuous data
20 connection.

Abbreviations

ETH Ethernet

PPP Point to Point Protocol

TCP Transmission Control Protocol

25 UDP User Datagram Protocol

IP Internet Protocol